

[Back](#)

6 page(s) will be printed.

Record: 12

92012703330013061319920104

Title: *Explaining* the *mystery*.

Subject(s): ECONOMICS

Source: Economist, 1/4/92, Vol. 322 Issue 7740, p15, 3p, 1 graph, 3bw

Abstract: Discusses how economists predict whether an economy's output will increase, by looking first at the gap between current output and its capacity for production, then at the forces that will affect this gap in the months ahead. Forces that drive long-term **growth**; Neoclassical theory; Theories; Examples; Production function useless; More.

AN: 9201270333

ISSN: 0013-0613

Full Text Word Count: 2991

Database: Academic Search Premier

ECONOMIC GROWTH

EXPLAINING THE MYSTERY

Until recently, economics had little of interest to say about economic *growth*. Now this is changing. The effects could be profound

LITTLE to say about **growth**? Surely economists talk of nothing else? Forecasters argue indefatigably about **growth** this year (even this quarter) and next. Economic advisers tell ministers that this tax cut or that increase in public spending will be good for **growth**. To some critics, indeed, the trouble with economics is precisely that its obsession with **growth** leaves issues such as sustainability out of account. True enough: economists are interested in **growth**. The trouble is that, even by their standards, they have been terribly ignorant about it. The depth of that ignorance has long been their best-kept secret.

What has kept it hidden is the distinction between short-term **growth** and long-term. To predict whether an economy's output will increase from one year to the next, no proper theory of **growth** is required--nor is one used. Economists look first at the gap between an economy's current output and its capacity for production, then at the forces (consumer confidence, the stock-building cycle, the state of other economies and what have you) that will affect this gap in the months ahead. Out of that comes a forecast of **growth**.

Such forecasts are informative enough to be taken seriously by governments and financial

markets. But they merely predict fluctuations around a trend, in the course of one business cycle. For long-term forecasting--estimating how far output will increase from one decade to the next--this approach is no use, because what matters here is not the gap between output and capacity, but the long-term trend of capacity itself.

Why has **growth** in productivity slowed in America in the past two decades? Did the reforms of the Thatcher years raise Britain's long-term rate of **growth**? Why have the economies of Japan, South Korea, Taiwan and the other Asian dragons expanded at an astonishing pace in the past 40 years, while much of Africa has stagnated or declined? How long will the ex-communist countries of Eastern Europe and the Soviet Union take to catch up with the West? To answer these questions needs something that economics has so far been unable to provide: an understanding of the forces that drive long-term **growth**.

Mainstream economics does have a theory of long-term **growth**. It was devised by Robert Solow, of the Massachusetts Institute of Technology, in the 1950s, and has been much modified and improved since then. But this so-called neoclassical theory is patently inadequate--so much so that its teachings have had virtually no influence on policy-makers. Only now are there signs of a change. The defects of the theory are the starting-point for new ideas which, with luck, may end the short-termism of economics and push long-term **growth** to the front of policy-makers' minds.

Assume better mousetraps

The heart of the neoclassical theory is an equation, called the production function, which says that the output of an economy depends on the amount of capital and labour employed. The theory also made some linked assumptions about this relationship. First, if you double the amount of both capital and labour, you will get twice as much output. This is the assumption of constant returns to scale. Second, if you add more capital to any given labour force, or more labour to any given stock of capital, you will get successively smaller increases in output: for each factor of production, holding the other fixed, there are diminishing returns.

These assumptions seemed plausible. Reassuringly, they were also consistent with the imagined world that economists call perfect competition. But they have a striking implication. In an economy where the stock of capital is rising faster than the labour force, the return to new investment (ie, to a further increase in the capital stock) should fall with time. For today's industrial countries, this has not happened: the returns to investment have been higher in the past few decades than they were in the late 19th and early 20th centuries.

In the same way, the theory implies that poor countries should find it easy to grow much faster than rich ones: investment in a country with little capital should spur output more powerfully than a proportionate amount of investment in a country with plenty. Again, the facts do not bear this out. The chart shows how GDP per head grew between 1960 and 1985 in 114 countries, ranked (poor-to-rich, left-to-right) by their GDP per head at the start of the period. If poor countries had found it easier to grow faster than rich ones, the points on this scatter-graph would cluster along a downward-sloping line, from top left to bottom right. Take the Asian dragons and the rich countries alone, and that seems to be so. Add in the rest of the world, however, and the trend vanishes.

To both these difficulties, the neoclassical theory has an answer: technological progress.

Though returns diminish as more capital is added to the economy, that effect is offset by the flow of new technology. This could explain why rates of return have stayed high in the industrial countries and, arguably, why most poor countries have not grown faster than rich ones.

Yet the theory still looks odd. For instance, it implies that a sustained increase in investment will not, of itself, raise an economy's long-term rate of **growth**. As the capital stock grows, more of each year's investment must be set aside to replace old machines as they wear out. An increase in investment, says the theory, will cause the capital stock to grow--but only until investment is again exactly sufficient to hold the amount of capital steady. So a permanent increase in investment--say, from 10% of GDP to 12% of GDP each year--will cause only a transitory increase in the capital stock, and hence in output. Ultimately, therefore, technological progress, not investment, is the engine of **growth**.

That makes it crucial to understand what technological progress is, and how it happens (we shall print an article on that next week). Neoclassical theory has no convincing answer. It supposes, in effect, that new technologies rain down from heaven as random scientific breakthroughs. In statistical terms, technological progress is simply ``the residual"--the thing that accounts for any **growth** that cannot be accounted for in other ways. When economists apply the theory to real economies, they get a poor fit. Typically, studies find that increases in capital and labour account for half or less of the **growth** in output. The rest is put down to technological progress or, as the residual is also known, ``total factor productivity". The neoclassical theory can explain only half of what it purports to explain.

The endogenous innovator

For 30 years the larger part of economic **growth** was thus consigned to a black box; the best that mainstream economics could do was to offer a choice of fancy labels for it. Outside the mainstream, and in a disconnected way, economists worked for years on how to look inside the box and make sense of the contents. Only recently have these strands of work begun to be drawn together into a radically new theory of **growth**.

With hindsight, intellectual historians will probably date the revival of **growth** theory to 1983 and a University of Chicago doctoral thesis entitled ``Dynamic Competitive Equilibria with Externalities, Increasing Returns and Unbounded **Growth**". Its author was Paul Romer, now a professor at the University of California at Berkeley and a fellow of the Canadian Institute for Advanced Research. Since then, he and a growing band of economists have built parts of a theory that seems likely to fit the facts. The work is still providing as many new questions as answers to old ones, but the outline of the next orthodoxy is now discernible.

Recall that the neoclassical theory takes into account just two factors of production: capital and labour. In effect, Mr Romer and his colleagues add another: knowledge. This makes the theoretical production function much more plausible, in several ways.

First, the new theory recognises that knowledge (eg, about how to make things) can raise the return on investment. This accounts for the evidence on rates of return over time, and the non-convergence of **growth** rates among countries. Second, whereas in the neoclassical theory technological progress just happens, in the new theory knowledge is a factor of production which, like capital, has to be paid for by forgoing current consumption. Economies

have to invest in knowledge in the same way that they invest in machines. Third, since past investment in capital may make it more profitable to accumulate knowledge, the new theory admits the possibility of a virtuous circle in which investment spurs knowledge and knowledge spurs investment. This in turn implies that a sustained increase in investment can permanently raise a country's **growth** rate--an idea that the traditional theory denied.

In short, the new theory is capable of **explaining** the world as it actually is. In his most recent work, Mr Romer has elaborated it, to take four factors of production into account: capital, unskilled labour, human capital (measured by years of education, for instance) and ideas (which might be measured by patents). Not everyone thinks that an improvement. But whether with three factors or four, Mr Romer's theory has one most uncomfortable consequence. It is flatly inconsistent with the idea of perfect competition--the theoretical underpinning not just of the neoclassical theory of **growth** but of a good part of modern economics. No wonder the old theory, despite its obvious drawbacks, survived so long.

Why is the new theory inconsistent with perfect competition? Because perfect competition means that firms are price-takers: they accept the price that rules in the market and cannot change it. Under constant returns to scale, as assumed by the old theory, this can be so. If firms cut their prices to win a bigger share of the market, they achieve no further economies of scale and therefore risk losing money.

With three (or more) factors, the assumption of constant returns to scale no longer stands up. Taking all the factors together, the production function shows increasing returns: if you double all the factors, output more than doubles. In this theoretical world, firms can cut prices, raise output and--thanks to lower costs--make a bigger profit than before. With increasing returns, therefore, competition is imperfect--another way of saying that firms are price-setters, not price-takers. This change may seem insignificant. In fact it turns economic theory inside out.

Despite that, Mr Romer's approach is likely to form the basis of mainstream thinking on **growth** during the coming years. Many recent advances in economic theory have started from, or ended up at, the idea of imperfect competition. This is partly because economists now have the mathematical techniques that are needed to explore it. Abandoning the assumption of perfect competition no longer means abandoning most formal analysis of economic systems. In this respect, the new **growth** theory is in tune with the times. The new theory is attractive in another way too. Because it simply brings new factors into the neoclassical production function, it can be seen--despite its far-reaching implications--as an extension of the existing orthodoxy. That makes it easier to digest.

Don't patch it up, chuck it out

If Mr Romer's approach is to be the new orthodoxy, its principal challenger will probably be a theory developed by Maurice Scott, of Nuffield College, Oxford. Though appealing, his theory is less digestible. The differences between the two shed light on the questions that the new generation of **growth** theorists will have to grapple with.

Mr Scott agrees that the neoclassical production function is no use. But rather than modify it, he wants to abandon it entirely. The core of his argument echoes an old debate in economics. He says that the measure of capital that appears in the production function is fundamentally incorrect.

The production function is concerned with the change in the net stock of capital--ie, with gross investment less depreciation. This implies that depreciation is a physical process that reduces the productivity of capital; as it were, a reduction in the number of machines in the economy. Wrong, says Mr Scott. Machines that are properly maintained can run at their designed capacity for years--long after the production function regards them as having evaporated. That is why some economists prefer a different measure of change, gross investment less scrapping. Wrong again, says Mr Scott. Machines are mostly scrapped when they become profitless. They may still be making things, but they are not adding to net output. So no productive capital is lost when they are scrapped.

This suggests that simple gross investment, without deductions, is the best measure of change in the capital stock. Yes--but there is a problem, says Mr Scott. It does not follow, as you might think, that the sum of all past gross investment provides a good measure of the stock, because there is no way of knowing how much each bit of old capital is contributing to total output. Regrettably, the idea of a production function that links the level of output to the level of capital must be abandoned. The best one can do is use changes in capital--gross investment--to explain changes in output.

Like Mr Romer, Mr Scott regards technological progress as crucial for understanding **growth**. In his theory, though, technological progress does not appear as a separate influence: he treats gross investment and technological progress as one and the same thing. At first sight, this view may seem puzzling, but there is plenty of evidence to support it. In a classic study, ``Invention and Economic **Growth**", Jacob Schmookler analysed nearly 1,000 major inventions in four industries (farming, railways, oil-refining and paper-making) around the world between 1800 and 1957. Where a stimulus for the invention could be identified, it was in nearly every case an economic one (ie, the invention was needed for some industrial purpose); in not a single case was the stimulus a particular scientific discovery.

Clearly, scientific progress broadens the possibilities for useful innovation. But the evidence suggests that, as Mr Scott says, ``inventions are motivated and caused by similar factors to those which cause investment, that is, by their expected profitability". Innovation does not pour down from heaven, as in the neoclassical world. Nor is technological progress, or ``knowledge", a commodity distinct from new capital, one that has to be separately invested in, as in the Romer models. Knowledge and investment, Mr Scott argues, are inextricably bundled up together.

In his most recent work, Mr Romer, in contrast, insists that the analytical effort of separating the two is worthwhile. Why have decades of heavy investment yielded so little in India and so much in South Korea and Taiwan? Perhaps because India's investment happened behind trade and foreign-investment barriers that kept out knowledge of new techniques and products, whereas the dragons' investment was mixed with a copious supply of new ideas. If nothing else, the debate over the new **growth** theories has revealed how bad economists have been at thinking about the national and global transmission of economic knowledge--production methods, designs for products and other forms of intellectual property.

Pure and applied

Much of the new work on **growth** has so far been abstract and theoretical; non-economists

can fairly wonder whether the effort will prove worthwhile. It will. Already the new **growth** theory is yielding results.

Studies by Robert Barro, of Harvard University, and others have used Mr Romer's approach in empirical studies that compare **growth** rates in many different countries. In statistical terms, the approach seems to work. In economic terms, its results are striking: lack of human capital (ie, education), not lack of investment in physical capital, is what prevents poor countries from catching up with rich ones. In a similar vein, Daniel Cohen, of CEPREMAP in Paris, has estimated feasible long-term **growth** rates for the reforming economies of Eastern Europe (where standards of education are comparatively high); he arrived at **growth** rates of income per person that ranged between 3% and 3.5% a year.

Richard Baldwin, of Columbia University, has used a Romer model to estimate the effects of the EC's single-market programme on **growth**. Traditional **growth** theory simply could not address such a question: it contained no mechanism by which trade liberalisation (or indeed anything but ``technological progress") could raise the long-term rate of **growth**. In the Romer framework, trade liberalisation is likely (though not certain) to raise the long-term rate of **growth**, by stimulating investment. The European Commission's Cecchini report concluded that the 1992 programme would raise the EC's output once and for all by between 2.5% and 6.5%, with no permanent effect on **growth**. Using the Romer framework, Mr Baldwin predicted not only a bigger one-off gain but also a permanent increase in the annual **growth** rate, of 0.25-0.9 of a percentage point.

As such studies multiply, the value of the new **growth** theory will become clearer. But it is to be hoped that its biggest effect will be to reorder the economic-policy agenda. This is influenced more than most politicians would admit by debates that they barely understand--witness Keynes and demand management after 1945, or Milton Fried-man and the monetarism of the 1970s. The new **growth** theory confirms that governments are mistaken to concentrate so exclusively on the business cycle. If, however indirectly, it leads them instead to think harder about education, investment, research and development, trade reform, intellectual-property rights and so on, it will be a breakthrough indeed.

Paul Romer's recent articles include ``Endogenous Technical Change" (Journal of Political Economy, 1990) and ``Are Nonconvexities Important for Understanding **Growth**?" (American Economic Review, 1990). Maurice Scott explains his theory in ``A New View of Economic **Growth**" (Oxford University Press, 1989) and in ``Four Lectures" (World Bank Discussion Paper 131, 1991).

Graph: Higgledy-piggledy: 114 countries: Annual **growth** of GDP per head, 1960-85 (Source: Summers and Heston [1988])

Photo: From this...

Photo: ...to this...

Photo: ...to get this

Copyright of **The Economist** is the property of Economist Newspaper, NA, Inc. and its content may not be copied or emailed to multiple sites or posted to a listserv without the copyright holder's express written permission. However, users may print, download, or email articles for individual use.

Source: Economist, 1/4/92, Vol. 322 Issue 7740, p15, 3p, 1 graph, 3bw.

Item Number: 9201270333

